

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 911. (No. 23, Vol. XVIII.)

JUNE 10, 1926

Weekly, Price 6d.
Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828.
Annual Subscription Rates, Post Free.

United Kingdom .. 30s. 4d. Abroad .. 33s. 0d.*

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* Foreign subscriptions must be remitted in British currency.

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EDITORIAL COMMENT.



VERY now and then, in the history of aviation, some particular type, or some particular arrangement, or some particular feature, becomes the "fashion" of the moment, as it were, and is regarded as a sort of panacea for all evils. Unfortunately, it has often been found in the past that these high hopes have not always been based upon a sufficiently thorough understanding of all the facts, or factors, involved, and consequently the history of aviation is full of examples of such "cure-alls" which have, after test, turned out to be, not the universal remedies expected, but merely one more detail improvement, one more step in the evolution of the aeroplane; contributing its share to the development, but in no way revolutionising the art and science of flying.

With these disappointments of the past in mind, one is apt to become, in time, a little sceptical where new ideas are promulgated, and to make, or attempt to make, allowances for the "factor of ignorance." Of recent years we have had one such "fashion" in the three-engined aeroplane. Theory indicates that the three-engined aeroplane capable of flying with but two of its engines working should to all intents and purposes be immune from risks due to forced landings, and should in practically all cases be able to reach, if not its destination, at any rate some place where a landing could be made with as great safety as on a terminal aerodrome. This theory is based, first of all, on the supposition that all three engines are of equal power, so that the stoppage of one results in the loss of but one-third of the total power (disregarding the effect of the drag of the airscrew of the stationary engine). Also that the installation of the three engines can be made individually as reliable as that of a single unit. Included in the term installation is the petrol system, and for the theory to hold good, this must be as reliable in the three-engined machine as in the single-engined, otherwise the reliability of each of the three engines may suffer, and the chances

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926

- June 11 Independent Force (R.A.F.) Dinner Club
Annual Re-union Dinner, Connaught
Rooms, Great Queen Street, Kingsway.
- June 12 Inst. Ae.E. visit to Croydon Aerodrome.
- July 3 Royal Air Force Display, Hendon.
- July 3 Second R.A.F. Iraq Dinner, Hotel Cecil.
- July 8-24 Royal Tournament, Olympia
- July 9-10 King's Cup Race, Hendon.
- July 11-27 German Seaplane Competition at Warnemunde.
- July 19-Aug. 7 French Competition for Multi-engined
Seaplanes, St. Raphael-Frejus.
- Aug. 9-15 French Light 'Plane Competition.
- Sept. 10-17 Two-Seater Light Aeroplane Competition,
Lympe.
- Sept. 18 Grosvenor Challenge Cup, at Lympe.
- Oct. Schneider Cup Race at Norfolk, Virginia,
U.S.A.
- Nov.-Dec. Paris Aero Show.

of forced landings become greater, thus failing to give the full advantage which the three-engined arrangement should theoretically offer.

Lest we should be misunderstood, and be accused of "damning the three-engined aeroplane with faint praise," we would emphasise the point that *at the moment* we share the hopes of those who believe that this type of machine will be found to add greatly to the safety of flying. At the same time, it is no use shutting one's eyes to the fact that so far the type must be regarded as being in the experimental stage, and that it is likely it will require considerable development before giving full value. It would be futile to assume that a machine, just because it is a three-engined machine, is necessarily *the* three-engined machine. One might as well claim that a tractor aeroplane, because it is a tractor, is the last word in tractor aeroplanes. Doubtless in years to come we shall see a variety of three-engined aeroplanes, unless the experience gained with the early ones should prove so disappointing that the type is abandoned, a contingency not, we think, at all likely to come to pass.

The great thing, for the moment, is that a real start should be made, and the possibilities of the three-engined aeroplane be thoroughly explored. It is for this reason that we look forward with more than ordinary interest to the completion and flying tests of the new de Havilland machine now under construction, and an illustrated description of which appears in this week's issue of *FLIGHT*. The de Havilland Aircraft Company has had more experience of commercial aircraft design and construction than any other British firm, and, although in the case of the D.H.66 the firm has not had altogether a free hand, having had to a considerable extent to comply with the requirements of Imperial Airways, Ltd., the new machine incorporates a good deal that is purely "de Havilland."

In this connection it is of interest to compare the D.H.66 with the Handley Page W.9, "Hampstead." The total loaded weight of the former is 14,700 lbs. and of the latter 14,500 lbs., so that the two machines are sufficiently nearly identical as regards weight. The wing areas are also approximately identical, so that the wing loadings are about the same. The D.H.66 is to be fitted with Bristol "Jupiters," while the "Hampstead" has three Armstrong-Siddeley "Jaguars." At the moment we are not quite clear which type of "Jupiter" is to be employed in the de Havilland machine, but it would seem likely that the D.H.66 will have rather greater power than the "Hampstead," and consequently a somewhat smaller power loading. At any rate, the two machines promise to be nearly enough similar to allow of a direct comparison, and it will be interesting to see how two famous designing firms solve the same problem.

One important difference is to be noted, however, whereas in the "Hampstead" the weight of petrol carried is but 1,700 lbs., in the D.H.66 provision has had to be made for carrying no less than 300 galls., or roughly 2,100 lbs., the machine being required for covering longer stages. A result of this is that the paying load is decreased correspondingly, the figures for the two machines being 2,260 lbs. and 3,220 lbs. respectively. It will be seen that this difference is not entirely accounted for by the

difference in the amount of fuel carried, but is made up also by a difference of approximately 500 lbs. in the empty weights, the "Hampstead" being the lighter of the two. Whether or not this difference is due to the steel structure of the D.H.66 fuselage is difficult to say without knowing the item weights of the two machines, information which we do not possess, but it would appear probable that to some extent at any rate this may be the explanation. It should be realised that with the steel tube structure it is necessary to make separate "boxes" for cabin, luggage compartment, etc., which must add a certain amount of extra weight. Incidentally, we believe that the De Havilland firm would have preferred to use, in the D.H.66, their usual plywood-covered fuselage, but that the steel tube structure was more or less demanded. At any rate the two types of machines are so nearly alike that direct comparisons in the future should prove interesting. There is yet another three-engined machine coming along, designed and built by Sir W. G. Armstrong Whitworth Aircraft, Ltd., which, like the D.H.66 and the "Hampstead," is a biplane of very similar general arrangement. It will thus be seen that in the near future there should be no lack of practical experience of three-engined aircraft, and if the present policy is vigorously pursued, Great Britain should be able to take a leading position in the production of this type. It is, perhaps, a somewhat significant fact that all three machines should be of the biplane type, since the monoplane seems to be more favoured abroad, famous examples being the Fokker monoplane on which Commander Byrd flew to the North Pole and back, and the Junkers, which is used extensively on the German air lines. Both of these are cantilever monoplanes, the Fokker being of the "high-wing" type and the Junkers of the "low-wing" type. From the point of view of wing weight there is probably little to choose between the two, although superficially at any rate it would seem that the "low-wing" type would lend itself rather better to "burying" the engines in the wing, and thus save a certain amount of resistance. The next few years will probably see quite a fight between the biplane and the monoplane in this class, and we should hesitate to express an opinion as to which type is likely to survive.

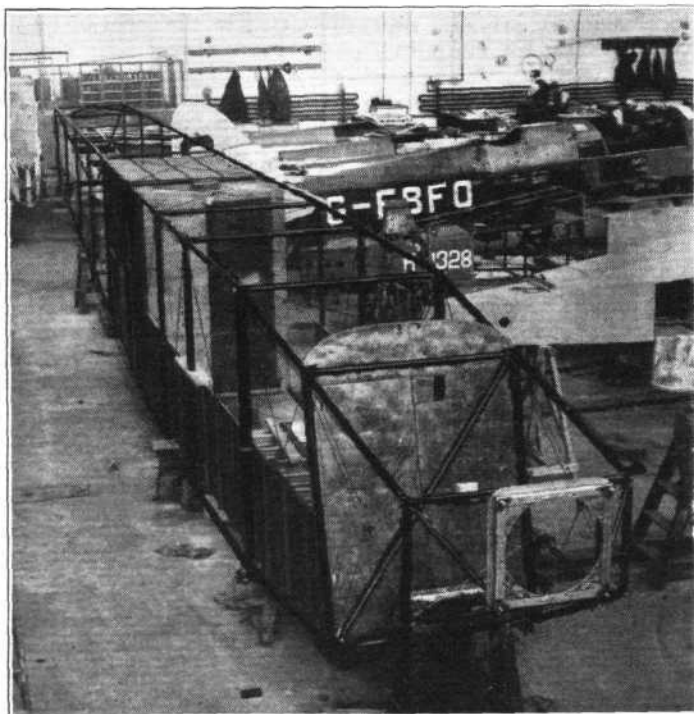
While on the subject of three-engined aeroplanes we should like to refer to a matter raised at one of the Royal Aero Club House Dinners by Major F. A. de V. Robertson. He suggested that for use in the Dominions, especially in Australia, British designers might be well advised to study the possibilities of the *small* three-engined aeroplane. He even suggested a machine with three Bristol "Cherubs," a remark which caused some little amusement. Actually the suggestion is by no means as ridiculous as might appear, since a machine with a total of 100 h.p. could presumably carry some 250 to 300 lbs. of paying load, which would represent quite a respectable mail bag in certain districts of Australia. In any case, the small three-engined aeroplane should not be overlooked, even if one does not care to go as low as 100 h.p. A machine with a total of some 350 h.p. would probably be viewed favourably in Australia, and for this reason we are sorry that the machine with three Bristol "Lucifers," which was once said to be coming along, has not yet materialised.

A NEW DE HAVILLAND COMMERCIAL AEROPLANE

The D.H. 66 with Three Bristol "Jupiter" Engines

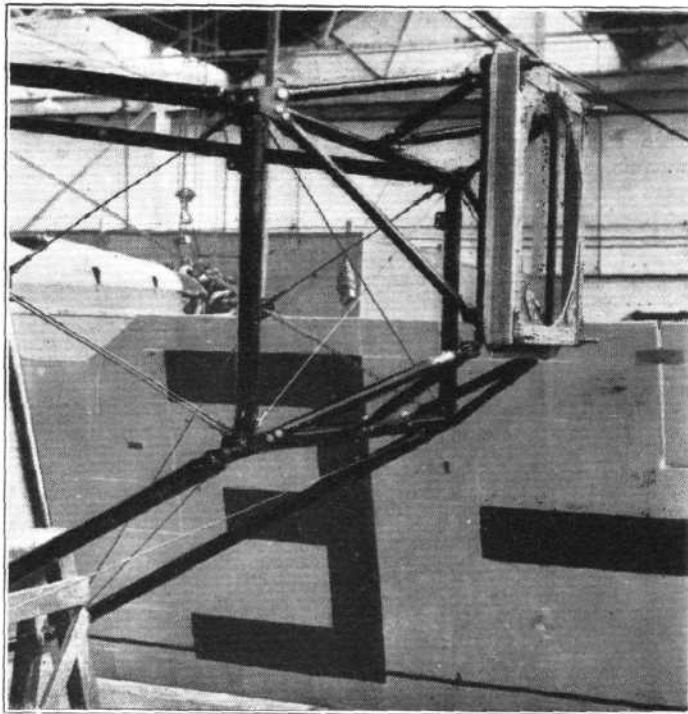
THE new De Havilland aeroplane, type D.H.66, which is now in course of construction at the Stag Lane works of the De Havilland Aircraft Company, marks a considerable

aeroplanes for a great number of years, the new three-engined machine being built for Imperial Airways, Ltd., has a fuselage of all-steel construction as regards its main structure. The



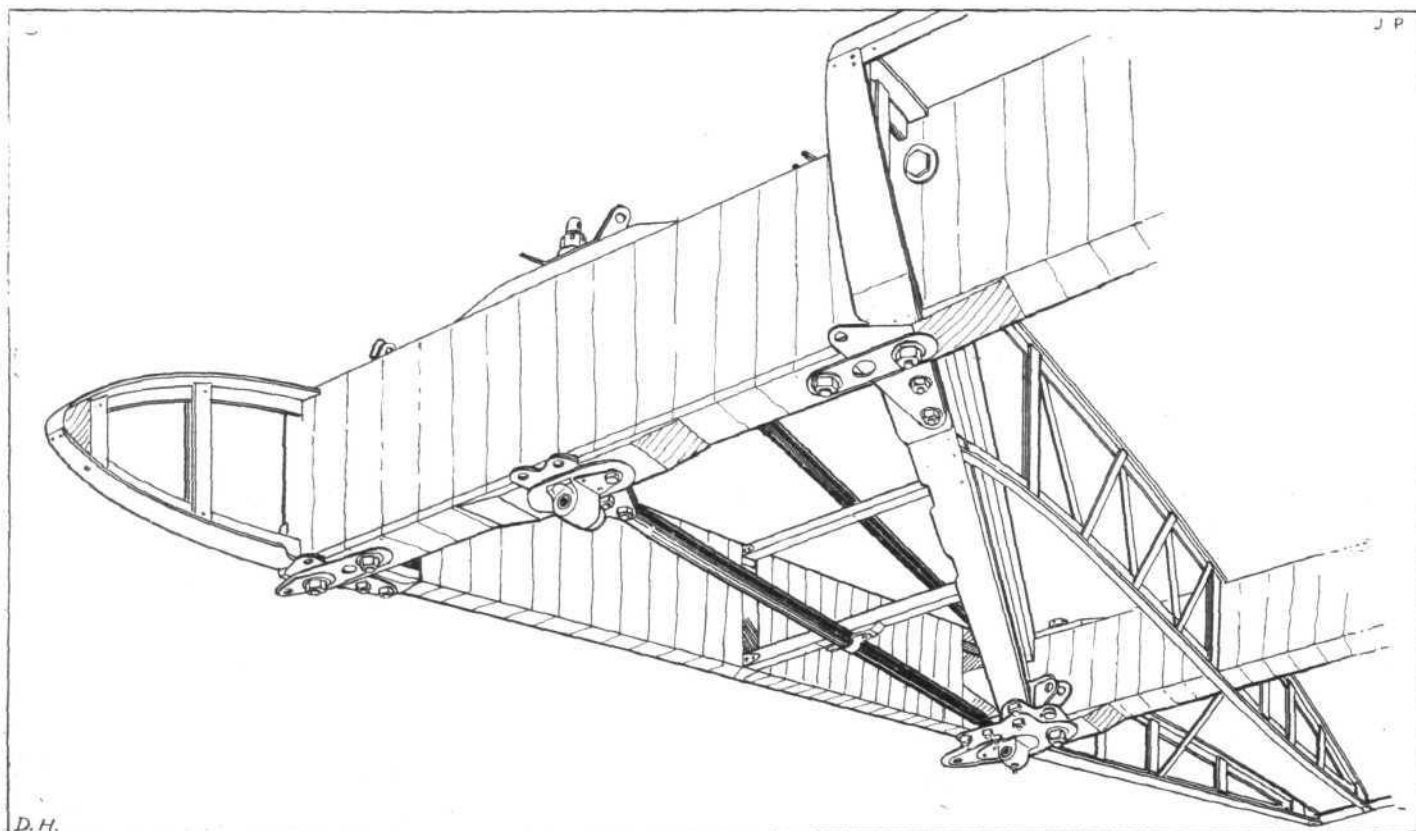
THE D.H. 66 : Three-quarter front view of the fuselage in skeleton. The main structure is of steel tube, and cabin, luggage compartment, etc., are in the form of "boxes" of three-ply, slipped into the main structure.

departure in several respects from normal De Havilland practice. Thus in place of the all-wood plywood-covered fuselage, which has characterised practically all De Havilland



THE D.H. 66 : The mounting for the central engine is extremely neat and simple. The engine plate is made of Duralumin and is very light. Details of this mounting are illustrated by sketches.

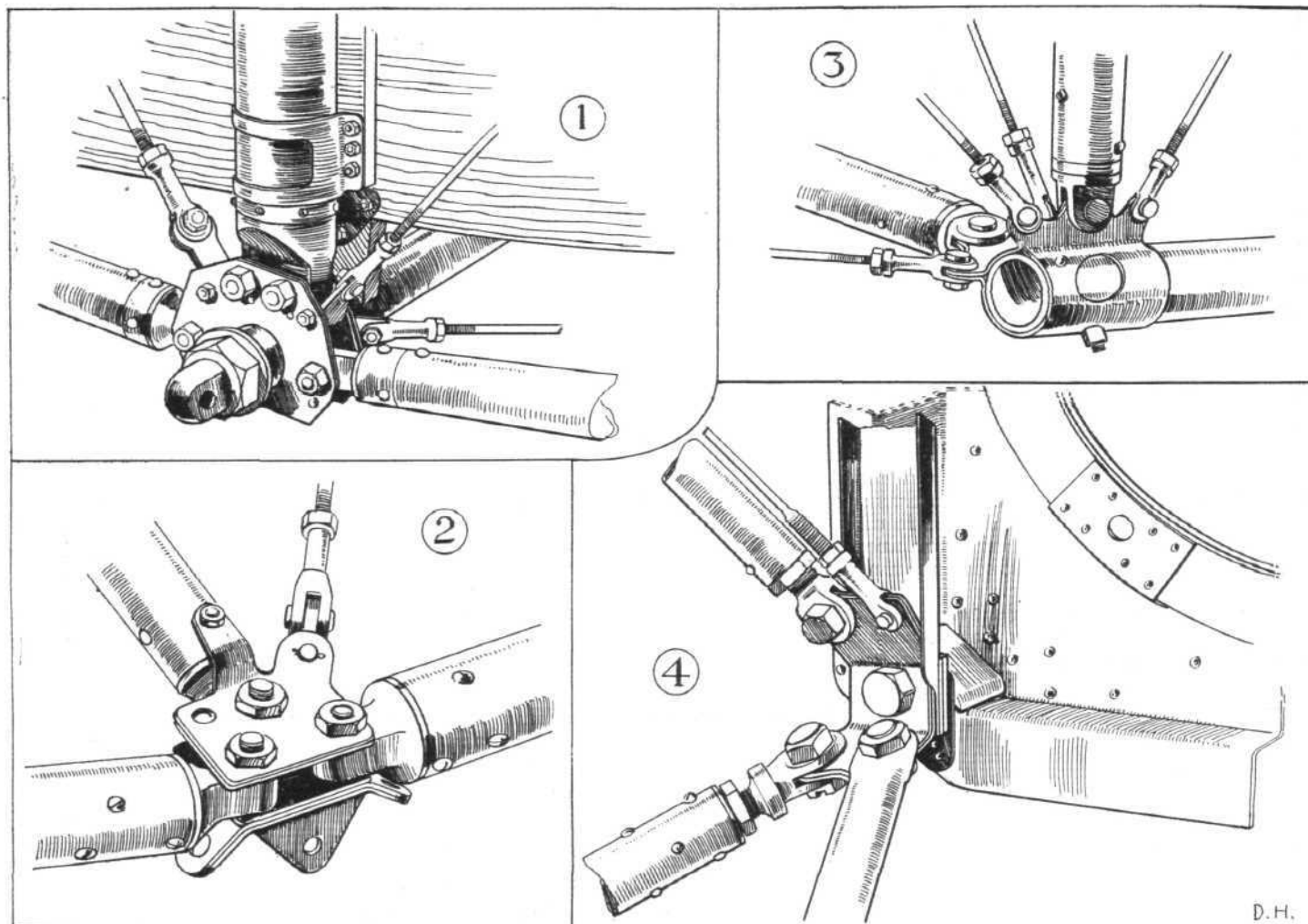
wings, on the other hand, are of normal De Havilland construction with box spars of wood and spruce ribs. It might have been thought that in a machine of this type (the



THE D.H. 66 : Sketch showing the triangulated structure in the lower plane, which carries one of the wing engines. The undercarriage struts are attached to the two fittings at front and rear ends of the longitudinal tube.

estimated total loaded weight is 14,700 lbs.) a more logical combination of wood and metal construction might have been provided by making the fuselage of the normal De Havilland plywood-covered type, but using metal for the construction of the wing spars. On the subject of metal construction it has been pointed out by Mr. C. C. Walker, Chief Engineer of the De Havilland Aircraft Co., that the scarcity of wood, which is one of the reasons, if not the main one, for the Air Ministry decision gradually to change over to all-metal construction, will be particularly felt in the matter of main wing spars for large machines, as it is here the difficulty of obtaining suitable spruce in sufficient lengths will mainly make itself felt. At the moment there does not appear to be any reason to believe that there will, within the near future at any rate, be any difficulty in obtaining the necessary material for the making of high-class plywood, and so there would not appear to be any urgent

the particular form of tubular construction employed in the D.H.66, and consequently several of our sketches this week show various joints between struts, longerons, chassis struts and wing roots as used in this construction. The fuselage main structure is of the rectangular section type, and the longerons do not run right through from nose to stern, but are divided at various points along their length, in places where a number of members meet. A feature of the construction is that the steel struts and longerons are in most places provided with Duralumin ends shaped to suit local requirements and generally either in the form of forked or plain ends for pin joints. The cross-bracing is by circular section tie-rods, and in certain panels where the stresses are exceptionally heavy these tie-rods are duplicated. The attachment of vertical and horizontal struts to the longerons is normally by clips bent around the longerons and pinned to them. The longerons are formed by sections of straight



THE D.H. 66 : Some constructional details. 1, shows the fuselage joint at the point where are attached the front spar of the lower wing and the inner end of the wheel axle. 2 is another fuselage joint slightly farther aft. This sketch was made from a fuselage side lying on trestles, and the sloping strut is actually vertical, while the wiring plates visible below the longeron belong to the cross-bracing of the floor panel of the bay. The joints in the rear portion of the fuselage are of the type illustrated in 3. All the steel tube struts and longerons have Duralumin ends, forked or plain, according to local requirements. Some details of the mounting of the nose engine are shown in 4. The engine plate itself is of Duralumin and is very light. It should be pointed out that the sketch is a rear view, and shows the back of the engine plate.

necessity for insisting upon the abolition of this material for the covering of fuselages, in which form plywood has proved itself to be both economical and durable. In point of fact we believe that the De Havilland Aircraft Company would have preferred to build the D.H.66 with plywood covered fuselage, but with wings having metal spars, and that it was mainly at the desire of Imperial Airways that the wood wings and steel tubular fuselage were decided upon.

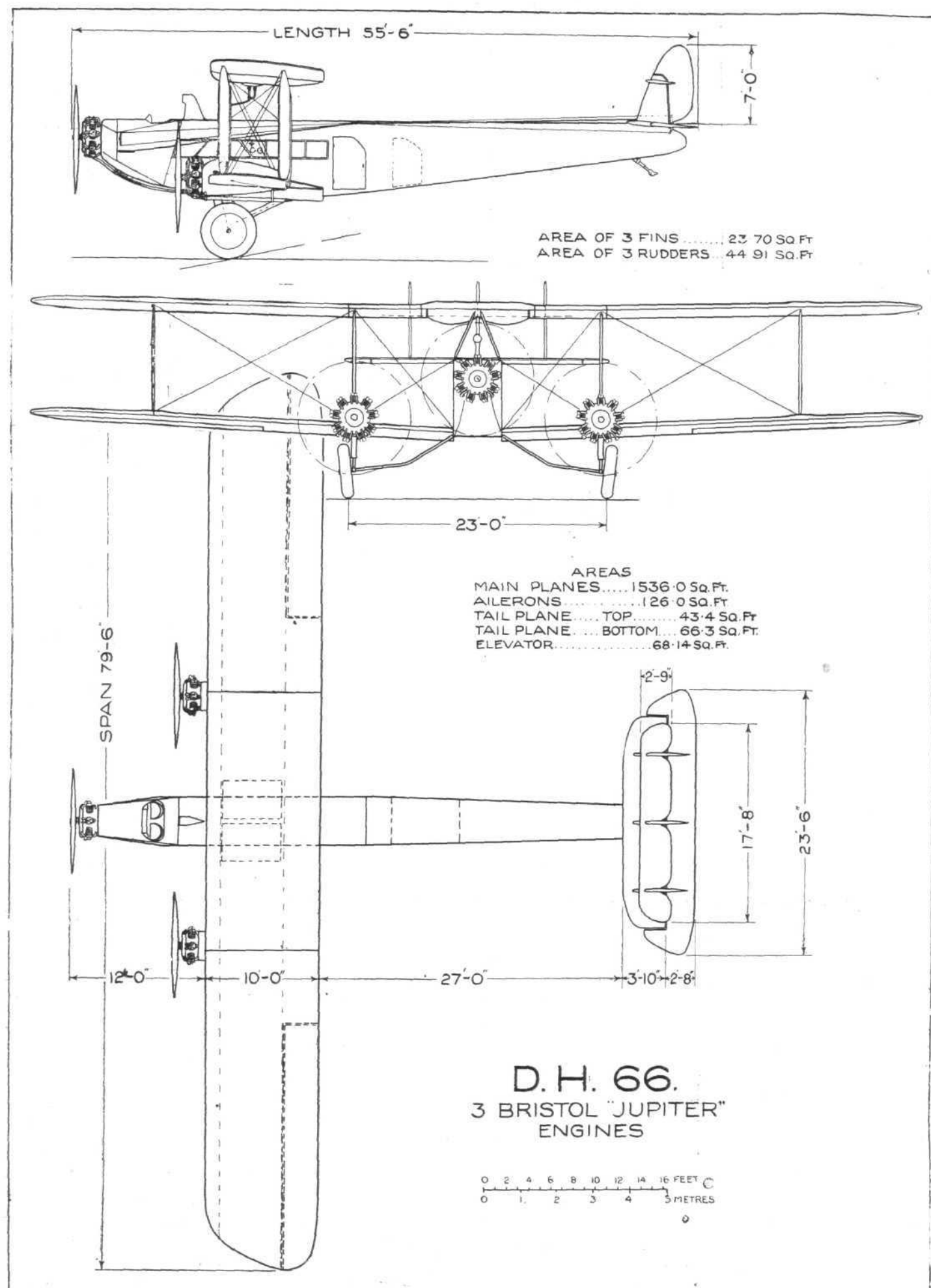
The Fuselage

Although the De Havilland Aircraft Company has by this time had considerable experience in metal construction, it has not hitherto been possible to illustrate in *FLIGHT* these forms of construction, as the machines so built have not been commercial machines, and so have not been available for detail illustration. That being so, we have thought it of interest to illustrate in considerable detail

tubes, so that the contour of the fuselage is not formed by curves but by a series of straight lines at varying angles. This, of course, is usual with tubular construction, as it avoids the trouble and expense of bending the tubes, and the effect upon the head resistance of the fuselage is probably negligible.

At the stern the fuselage does not terminate in a vertical sternpost as is usually the case, but ends in a fairly wide flat panel. This form of construction is due to the fact that the D.H.66 is provided with a biplane tail which, in order to allow of trimming the horizontal tail plane, is built up as an independent unit, hinged to the top longerons at the corners of the last bay. The tail plane trimming gear is enclosed in a casing which serves to streamline the rear portion of the fuselage, but which is not a part of the main structure.

In front the fuselage tapers fairly abruptly to a very



THE D.H. 66 : General arrangement drawings to scale.

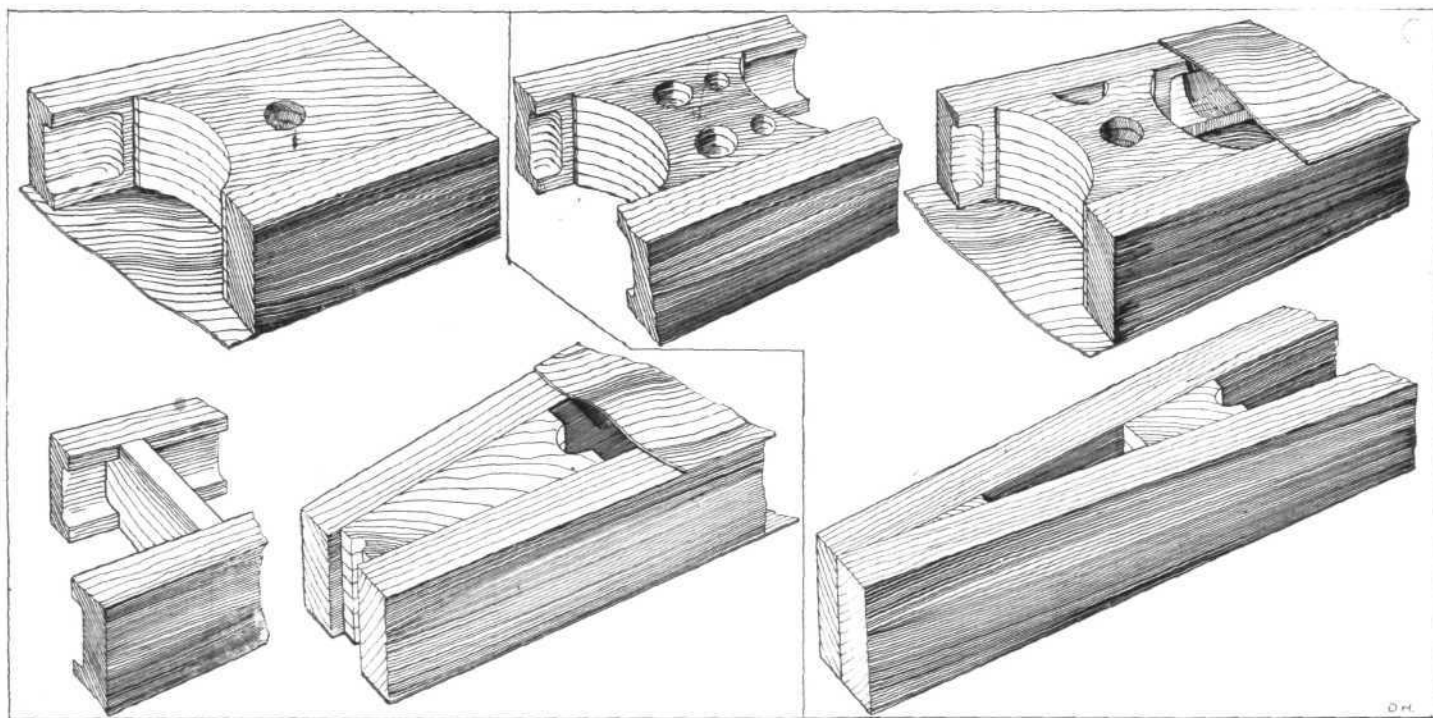
small engine plate for the central "Jupiter" engine. The engine plate itself is made of Duralumin, and appears to be extremely light. It is attached to the steel tube longerons by four large bolts, and the engine is thus readily removable. The front panel of the main fuselage is triangulated by steel tubes, and in the case of two of these tubes, tie-rods run parallel with the tubes, although the latter are working in tension. We gather that the object of these tie-rods is not so much to provide duplication for the tubes as to prevent any play developing due to vibration, as the tie-rods can be so tightened up that there is no possibility of "chattering" occurring. The engine mounting is shown in a photograph, and some of its details are illustrated by sketches which should make the arrangement quite clear. The mounting is very clean, and leaves ample space for getting at the components mounted on the back of the engine.

One of the disadvantages of the steel tubular fuselage in a machine of the type of the D.H. 66 is that the cabin has to be built up in the form of a three-ply "box" slipped into the fuselage from the top when the latter has been erected. This must necessarily mean a certain amount of extra weight and not inconsiderable extra expense, but it is difficult to see any way of getting around it. The floor of the cabin has fairly stout cross-members underneath, but these stop

In the general arrangement drawings published on page 331 will be seen a peculiar funnel projecting from the roof of the fuselage. This is a ventilator which, owing to the speed of the machine, will force air into a diffuser box from which in turn, fresh air will filter into the cabin without causing a draught. Details of the ventilating arrangement cannot be given at the moment, but when the machine is finished and flying we hope to publish another article and illustrations of certain features which cannot well be illustrated at the moment.

The Wings.

As already mentioned, the wings of the D.H. 66 are of perfectly normal construction, with box spars having plywood walls and spruce flanges. At the points where occur the attachments for the interplane struts, internal packing pieces are introduced and the form of these is illustrated by a sketch, from which it will be seen that these distance pieces are built up from multi-ply spruce. The ribs are of spruce and are of the same type as has been used by the De Havilland Aircraft Company in a great number of their types during recent years. The wing section used is R.A.F. 15. The wing covering is fabric, doped and varnished in the usual manner. Leading and trailing edges are in the form of Duralumin tubes, but with the exception of these and the internal drag bracing, the wings are of all-wood construction. Owing



THE D.H. 66 : Some spar details. On the left, the distance-pieces separating the spar flanges in the inner bay, and on the right, the same, but in a slightly different form, in the end sections of the wing. The spars are of spruce, spindled out as indicated, and the distance-pieces are of laminated spruce, while the spar walls are of three-ply.

short inside the bottom longerons, and the cabin "box" is supported at the corners only, so as to avoid placing bending stresses on the lower longerons due to the weight of the cabin and its contents. The actual supports under the corners of the cabin are in the form of wood blocks, shaped to fit over the top of the cross tubes in the bottom panel of the fuselage, so that all the stresses are concentrated very close to the joints and the bending moments imposed are a minimum.

As the De Havilland type 66 is intended for use on the Cairo-Baghdad line which it is hoped to open next spring, the whole of the cabin space will probably not be devoted to passenger accommodation, and at the moment we understand it is intended to provide seats for seven passengers only, the rest of the space available (465 cub. ft.) being intended for goods and mails. Should it later be desired to use the machine entirely for passenger-carrying, a number of extra seats would, of course, be fitted.

Aft of the cabin is another "box" of plywood which forms the luggage compartment. Vertical strips of wood of semi-circular section are tacked to the cabin in order to protect and stiffen the plywood against accidental damage by heavy luggage. The compartment is a large one (155 cub. ft.) and should be ample for the amount of personal luggage likely to be required for seven passengers. It is provided with a separate door.

to the fact that two wing engines are mounted on the lower plane, the wing construction has been somewhat altered at the points where these two engines are mounted. From one of our sketches, which illustrates the framework carrying one of the wing engines, it will be seen that the lower plane incorporates at this point a system of triangulation formed by the front spar and two stout box ribs, the apex of the triangle falling on the rear spar. A result of this triangulated engine support is that the end rib of this section of the wing has a fairly pronounced rake. (The outer portion of the wing is, of course, raked at its inner end to the same angle.) The engine plate itself is bolted to this triangular structure and the front spar, but as the engine plates were not in place when our sketches were obtained it has not been possible to show the details of the wing engine mounting.

Later on, when the construction of the machine is further advanced, we hope to illustrate this detail, as well as certain other features.

The Tail.

One of the unusual features in the design of the D.H. 66 is the tail unit. This comprises a biplane tail with a single elevator hinged to the lower tail plane only, and of three vertical fins and three rudders. The tail unit is built in two symmetrical halves in order to reduce the number of spares necessary. Thus a spare fin can be used either in the central

position or in one of the two outer positions, and the same applies to the rudders. Equally, the two halves of each of the tail planes are identical, so that a spare for either tail plane can be used at will on the port or starboard side.

Another unusual feature of the tail design is the method adopted for trimming the tail. Owing to the rigidly-braced biplane structure, the usual tail trimming gears could not well be employed, and in place of this the designers of the D.H.66 have adopted a system which is similar in principle to, although quite different in detail from, the tail plane-trimming gear patented by the Westland Aircraft Works. The lower tail plane is hinged to the main fuselage at the rear ends of the top longerons, and is braced by an inverted pyramid of steel tubes meeting at a point in line with the lower surface of the fuselage. A worm gear is interposed between the fixed portion of the fuselage and the apex of this inverted pyramid, so that when the worm gear is rotated the top of the pyramid is brought closer to or farther away from the fixed fuselage structure, according to the direction of rotation. The tail-trimming gear, steel-tube pyramid, etc., are enclosed in a light casing, which serves to fair off the rear portion of the fuselage, and means are provided for covering up the gap between the fixed and moving parts when the tail is trimmed to its smallest angle of incidence.

The Undercarriage

The undercarriage is of conventional type, with bent axles and V supporting struts, of which the front ones are telescopic and contain the usual rubber blocks working in compression. Generally speaking, the undercarriage is similar to that of the D.H.54, which has already been illustrated in *FLIGHT*.

The Power Plant

Reference has already been made to the mounting of the three Bristol "Jupiter" engines, and to the illustrations showing the engine plate for the central engine and the wing

structure supporting the engine plates of the wing engines. A reference to the front elevation of the machine will show that by so arranging the design that the central engine is considerably above the level of the wing engines, it has been possible to avoid overlapping of the propeller discs without placing the wing engines excessively far out from the fuselage. Experience with three-engined machines seems to show that flutter and vibration are apt to occur when the propeller discs overlap, and in the D.H.66 there should be no trouble on this score, as the slip streams should clear one another by a considerable margin.

The main petrol tanks are placed in the centre section of the top plane so as to give direct gravity feed to the engines, with consequent simplification of the petrol system. As the machine is required to have a rather large cruising radius, the petrol capacity is high, *i.e.*, 300 gallons, and in contemplating the machine from the point of view of paying load carried, this fact should be kept in mind, as the fuel and oil to be carried account for no less than 2,500 lbs. of the disposable load.

Certain other features of the D.H.66 are worthy of a closer study, but it is preferred to defer a reference to these until a later date, when the machine is in a more advanced state of completion, and when certain other features can be illustrated by photographs and sketches, which is not possible at the present moment. No performance figures are available at present, but the following figures of weight, etc., may be of interest. The weight of the machine empty is 9,060 lbs. The weight of fuel and oil is 2,500 lbs., and of pilot and navigator 360 lbs., leaving a paying load of 2,260 lbs. As the total loaded weight of the machine is estimated at 14,700 lbs., there is an item of 520 lbs. not accounted for. This weight is believed to be represented by instruments, cabin equipment, etc., which are not included in the figure for empty weight. As the wing area is 1,536 sq. ft., the wing loading is 9.57 lbs./sq. ft.

LIGHT PLANE CLUB DOINGS

London Aeroplane Club

The flying time for the week ending May 6 was 41 hours 35 minutes. The following Members had flying instruction:—G. Quirk, B. B. Tucker, Miss O'Brien, T. H. O. Richardson, O. J. Tapper, G. Eady, S. O. Bradshaw, A. G. D. Alderson, J. H. Saffery, R. C. Presland, F. S. Adams, O. J. Marstrand, J. C. Parkinson, G. Black, Capt. Godfrey, J. W. K. Malcolm, G. W. Hall, J. G. Luks, C. E. V. Hewland, E. Cooper, E. D. Moss, Sir John Rhodes, H. Solomon, Dr. Wall, E. K. Blyth, O. J. Barros, J. A. Simson, Mrs. Elliott-Lynn.

The following Members made solo flights for the first time:—E. D. Moss, G. Quirk, A. G. D. Alderson, S. O. Bradshaw, R. C. Presland. The following Members also made solo flights:—N. J. Hulbert, W. Hay, E. S. Brough, A. Lees, R. Malcolm, Major K. M. Beaumont, G. Wallcousins, W. Roche Kelly, H. Kennedy, G. H. Craig.

The following Associate Members were given joy rides:—Mrs. Malcolm, Miss Henderson, Mrs. Black.

G. T. Witcombe the second pilot instructor, is away ill, and Squad-Leader M. E. A. Wright kindly assisted in the flying instruction work. In order to cope with the increasing demand for instruction in flying, the Club has engaged S. L. F. St. Barbe as pilot instructor.

J. S. M. Michie, who has been with the Club since it started as Ground Engineer, has obtained his Aviator's Certificate. The tests were successfully carried out at Lymington during the time the Club machines were there on strike transport.

Mrs. Elliott-Lynn has now satisfied all the requirements for a "B" Licence. The night flying test was done on Monday, May 31, 1926, starting at 10 p.m., from Stag Lane, and finishing at 10.30 p.m. Mrs. Elliott-Lynn, who received all her training at the London Aeroplane Club, is the first Member to satisfy the requirements for a "B" Licence.

Sir John Rhodes, who gained his Aviator's Certificate last week, has taken delivery of his own D.H. "Moth," and on Saturday last made a trip to Ostend.

The Midland Aero Club

REPORT, week ending June 5: Machines serviceable, One.

The attendance at the Aerodrome has been fairly regular during the past few weeks, but owing to very unsettled weather, and the fact that one machine has been unserviceable for some time with engine trouble, only a limited amount of flying has been done.

The Club has now five Members ready for "A" Licence, and 10 *ab initio*

Aerial Rally at Ostend

THE Aero Club of Belgium are holding an Aerial Rally at Ostende on June 26 to 28, and have asked the Royal Aero Club to participate. The programme is as follows:—

June 26.—Reception at the Aerodrome, Ostende, 2 p.m. to 5 p.m.; Dinner at Hotel Splendid, Ostende; Gala Evening at the Kursaal.

June 27.—Reception at the Hotel de Ville by the Burgomaster; Luncheon at the Hotel Splendid, Ostende; Flying Competitions at the Race Course, Ostende; Dinner at the Hotel Splendid, Ostende; Gala Evening at the Kursaal.

solo pupils. Most of the flying work is done between the hours of 6 p.m. and 9 p.m., as very few members are able to get away from business during the day time.

Both machines EBLW and EBLT have nearly completed 200 hours each, and are still in excellent condition.

The Club's new hangar and quarters are progressing rapidly, and should be ready for occupation at the end of July.

The Newcastle-upon-Tyne Aero Club

REPORT for week ending June 6. Total flying time, 40 hours 55 mins., all on G-EBLY, (Bernicia), as the engine of LX is at the makers' for overhaul.

Dual, 13.25; solo, 16.30; tests, 10 mins. Passenger, 1 hour 10 mins. Photographic flight to Epsom, 9 hours 40 mins.

The following Members flew under instruction:—Mrs. Marcks, Miss Leathart, Col. Sir Joseph Reed, Messrs. Phillips, Bruce, Thirlwell, George, Twine, J. Bell Barnes, W. Todd, Palmer and Dr. Dixon.

Pilot Members: Mr. R. N. Thompson flew with Mrs. Thompson and Mr. Davidson, as passengers. Mr. N. S. Todd took Mr. Campbell for one flight.

Solo: Mr. Macmillan, Mr. Phillips, Mr. C. Thompson, Dr. Dixon.

Passengers with Major Packman, Miss Dixon, Mr. Baker. Mr. Phillips was "launched" on the 4th, and Dr. Dixon on the 6th, both putting up excellent performances after just over six hours' dual instruction each.

The total time flown from the commencement (September last) to date is 717 hours, 62 members have received instruction, 8 have licences, and 5 are now flying solo.

Major Packman took a representative of the Newcastle Chronicle, Ltd., to Epsom on Derby Day, but met with appalling weather conditions, having continuous rain throughout the journey except for about 15 miles out and on return to the Aerodrome, though the weather there was perfect all the time.

The Club was honoured with a visit from Brig.-General J. Weir, on his DeH. 51A, on Monday, May 31, when he called for lunch. Unfortunately, Major Packman takes his holiday on Monday, and it is usually a quiet day, and there was only Mr. Brown, engineer, the secretary, and, fortunately, Mr. Wingfield, the steward, to meet him. After filling up (the pilot) General Weir proceeded on his journey to London, *via* Brough, staying only about one hour at the Aerodrome, exactly as he would have done after calling at a Motor Club had he been travelling by car.

All wishing to attend must travel by air and arrive at the Aerodrome between 2 p.m. and 5 p.m. on June 26.

The whole charge is 300 francs (£2), which includes accommodation at the Hotel Splendid and all meals.

Members and others interested are requested to communicate with the Secretary, Royal Aero Club, 3, Clifford Street, London, W. 1., or F. Handley Page, Esq., Handley Page, Ltd., Cricklewood, N.W. 2, who, we understand, has been appointed by the Aero Club of Belgium as the "Commissaire Sportif" for Great Britain.

Gliding with a Passenger, Record

A NEW record for a gliding flight with a passenger was set up on June 3 at Rossitten, E. Prussia, by Herr Otto Schulz who remained in the air for 9 hrs. 21 mins.

AIR DRILL

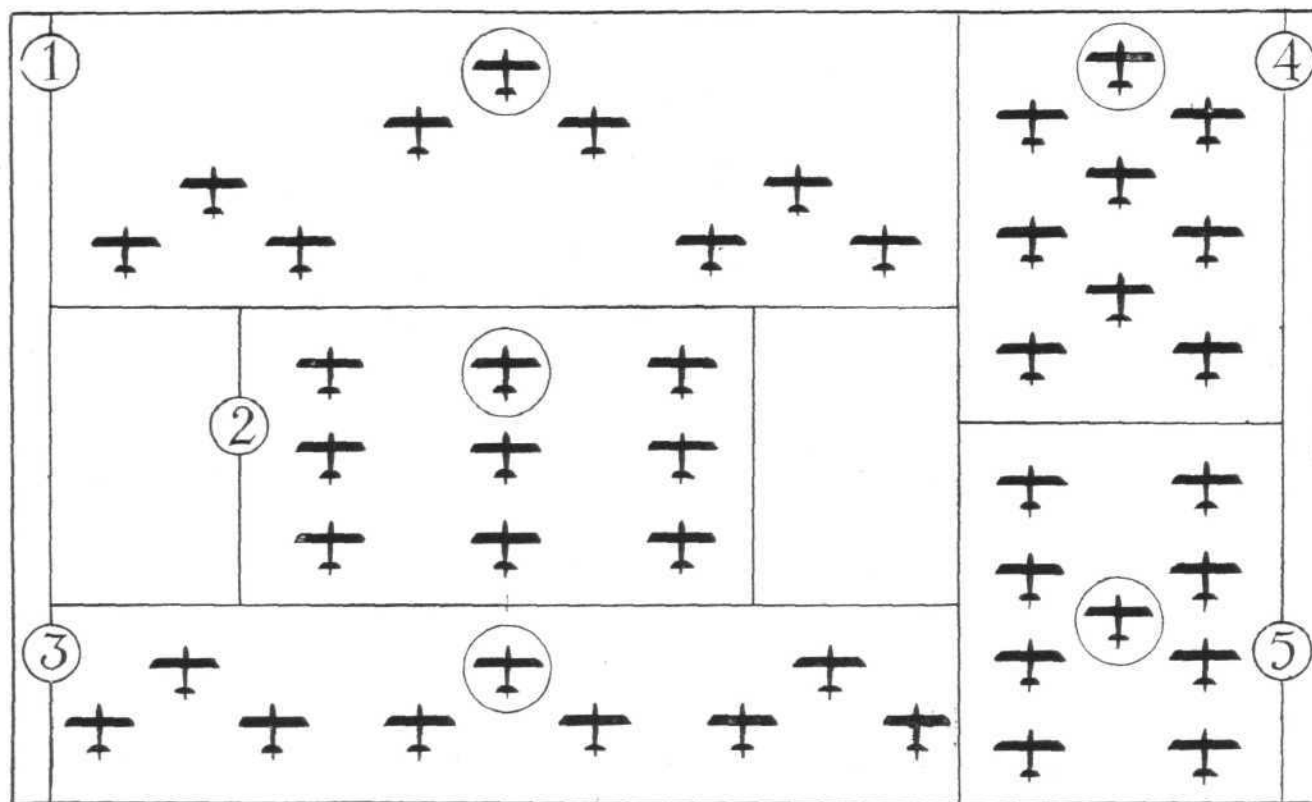
By Major F. A. de V. Robertson, V.D.

THE Army has been drilling hard for centuries, and about every five or six years it issues a new and reformed drill book. In the space of time required to earn a Volunteer Officer's Decoration, the present writer has worked under at least four drill manuals, which illustrates the difficulty of arriving, even after vast experience, at an ultimate best. The Royal Air Force is now setting to work to evolve an air drill manual. Its authorities are displaying great prudence, and have evidently realised the proverbial folly of rushing in. As a matter of fact, various thoughtful squadron leaders, notably Squadron Leader A. H. Peck, of No. 25 Fighter Squadron, are engaged in working out by experiment the best methods of carrying out the details. The Air Ministry has got as far as issuing a provisional manual of Air Drill, which describes various formations and gives the R/T orders which will produce the desired result. Very prudently, it does not describe the course which each aeroplane will follow in changing to its new position—still less the motions of rudder and joystick which will urge it upon that course.

Air drill is necessarily more complicated than ground

flight consists of three or five aeroplanes the normal arrangement is the V, called Vic. Where there are four, a star is formed, with the fourth machine to the rear of the leader. Either the Vic or the Star is called "Flight Formation." Other arrangements may be ordered, such as "Flight in line abreast," "Flight in line astern" (of the leader), "Flight in echelon to port (or starboard)." A flight may also be stepped up or down from the leader. The formation may also be opened out to distances or intervals of the required number of spans.

Squadron drill is more complicated. Each complete flight may be a unit of the squadron and the squadron leader can vary not only the disposition of the flights in the squadron but also the disposition of the aeroplanes in the flights. The normal "Squadron Formation" is a V, each point consisting of a "Flight Formation." (Fig. 1.) The squadron, however, can remain in "Squadron Formation," while each flight is in "Line Astern" or "Line Abreast," or some other formation. When this is ordered, the first word refers to the disposition of the aeroplanes in each flight, and following on this is given the disposition of the flights in the squadron.



drill, for the simple reason that the third dimension enters into the matter. The principles of drill, however, are as eternal as the principles of tactics. Any man who has a taste for drill, or at least a head for drill, only needs to master the system upon which any given drill book works, and he can then improvise for himself new formations and new orders in accordance with that system, which will be quite orthodox even though they do not appear in the drill book.

For instance, the proximity of one aeroplane or one sub-formation to another is described by three terms—(1) Interval. (2) Distance. (3) Space. The first two are taken from infantry drill, and the third has had to be improvised for the air. "Interval" means the number of spans between the nearest wing tips of adjacent aeroplanes (or sub-formations), measured horizontally and at right angles to the line of flight. In other words, the measurement is taken from left to right of a line, an echelon, a V; or similar formation. Distance is a measurement from front to rear. It means the number of spans between the rearmost part of one aeroplane and the foremost part of the next behind it, measured horizontally and parallel to the line of flight. Space is a vertical measurement, namely, the number of spans between the highest part of one aeroplane and the lowest part of the next above it. The minimum interval and distance at present allowed is two spans of the type of aircraft engaged.

Flight drill is first dealt with in the manual. When the

A typical order given in the manual is "astern, flights abreast, 1 repeat, astern, flights abreast, Go." The executive word is always "Go." This order would produce the formation shown in Fig. 2. The circle indicates the squadron leader.

The flight formations may, however, be broken up; whereupon the squadron consists, not of three units (each being a flight), but of nine units, each being an aeroplane. In these conditions the leader can order "Squadron Vic" (one simple V.), "Squadron Line Abreast," "Squadron Line Astern," all of which explain themselves. The manual does not lay down which aeroplane moves into which place.

In wheeling, to use an infantry phrase, a number of points to starboard or port is given, each point representing 10 degrees. Thus, "18 points starboard" wheels the whole formation round to the right and brings it back in the direction from which it had come. It is, however, a cumbersome manoeuvre and takes time. Turning about is much quicker and neater, and squadrons are still working out the best methods of turning in each formation.

On June 3 No. 25 Fighter Squadron gave a practice demonstration at Kenley before Air Vice-Marshal Brooke Popham, commanding the Fighting Area. Sqdn.-Ldr. A. H. Peck explained that it was only their fifth practice, and they hoped to get much closer and more accurate in their manoeuvres before the display. They gave demonstrations of turning about in five different formations.

On the alarm by the klaxon, all nine pilots, with parachutes dangling behind them, ran as hard as they could to their Grebes, and the Jaguars were started up. They took off in squadron formation and flew across the aerodrome. On the command to turn about, the second and third flights banked and turned outwards. In No. 1 Flight the leader went up to the top of a loop and there did a half-roll, while the other two each did an Immelman turn outwards. This brought all back into squadron formation in the reverse direction. Next they came across "Flights Abreast" (Fig. 3). The turn was the same as from "Squadron formation." The third turn-about was from "Flights Astern" (Fig. 4). This time all three leaders did a half-loop and half roll, while all the others did Immelmans outwards.

The fourth disposition was "Squadron Vic." This time the

leader did the half-loop and half roll, while the rest in four successive pairs did Immelman turns outwards.

The last turn about was done in "Two Lines Astern" (Fig. 5). This time all did the half-roll and half loop in successive pairs. They then came in "Squadron Line Abreast," and when over the aerodrome they re-formed squadron and landed by flights.

This drill shows several points of advance on that of last year. Nevertheless, nothing is yet stereotyped and the manual is only provisional. The radio-telephony worked fairly well, but there still is room for a good deal of improvement. As for the execution by No. 25, the "Cuckoos" were remarkably good for their fifth practice, and by July 3 they will doubtless be as highly polished as they were last year.

THE DE HAVILLAND SCHOOLBOYS' ESSAY COMPETITION

THE result has just been announced of the Essay Competition which was organised by the de Havilland Aircraft Co., Ltd., in connection with the Schoolboys' Exhibition held last January. This result has, unfortunately, been delayed owing to the absence from this country of Col. the Master of Sempill, who kindly consented to act as judge. The prizes have been awarded in the following order of merit:—

1st Prize.—Two half-hour flying lessons or a flight of 100 miles on a D.H. "Moth," to H. A. Richards, 250, High Road, Goodmayes, Essex.

2nd Prize.—Half-hour flying lesson or a flight over London on a D.H. "Moth," to V. M. Hickson, 106, Chetwynd Road, London, N.W. 5.

3rd Prize.—Joy-rides on a D.H. "Moth," to L. G. Valpy, King's School, Canterbury, Kent; and K. G. I. Scott, Blinkbonny, Beechwaye, Gerrard's Cross, Bucks.

In giving his decision regarding this competition, Col. Sempill wrote to the De Havilland Co. as follows:—

"I think that the response that has come to your Essay Competition for boys under 18 is quite remarkable, and the high level shown by the bulk of the essays is really satisfactory. It has been somewhat difficult to decide the order of merit,

as the four essays ultimately picked out for final placing are uniformly good.

"Some of the remarks are particularly apt; for instance, L. G. Valpy says:—

"There are countless absurd regulations issued by the Air Ministry regarding the private ownership of aeroplanes; consequently, at this time there are only four or five people in England who fly their private aeroplanes."

"Again, K. G. I. Scott says:—

"Flying as a pastime does not appeal to the average member of the British public. He is very willing to watch (free of charge) any flying exhibition if it is to be really sensational, but at the end of the performance he goes away totally unimpressed with the safety of civil aviation, and still holding a strong desire to keep at least one foot on mother of earth."

"It is interesting to note that the great bulk of the essays submitted comes from boys living on or near the well-traversed air routes."

Owing to the excellent standard of all the essays submitted, the de Havilland Co. have decided to extend the number of consolation prizes, and a mounted photograph of a de Havilland "Moth" in flight will be sent to every entrant.

Sir Sefton Brancker on Marine Aircraft

SPEAKING at the recent luncheon of the Southampton Chamber of Commerce, Air Vice-Marshal Sir Sefton Brancker referred to the importance of the shipowning industry taking a prominent part in the work of the development of air transport. Sea transport, he pointed out, should not be displaced, but rather stimulated by the alliance with it of air transport, which should be regarded, not as a rival, but as a handmaiden which could be of considerable value to them. He suggested that those who were responsible for the big enterprise of the new docks in Southampton should not forget to provide in those docks facilities for the arrival and departure of marine aircraft. The provision for proper slipways, sheds and moorings would be a fleabite in the total cost of the new docks, but might be of very great importance in the future.

Sir Samuel Hoare and the British Empire League

TOMORROW, June 11, the British Empire League is giving a luncheon to Sir Samuel Hoare, Secretary of State for Air, who will speak on "The Future Development of Empire Air Communication." The Duke of Sutherland will take the chair.

East African Air Mail

It is reported that the negotiations with the Sudan, Uganda, and Kenya authorities for the establishment of an experimental air service between Khartoum and Lake Victoria have now reached a point where the whole of the documents are merely awaiting the ratification of the Colonial Office. It is expected that the North Sea Aerial and General Transport Company, who have been carrying out the negotiations, and who are associated with the Blackburn Aeroplane Company, will probably be ready to operate in about six months' time.

Croydon-Cairo Test Flight

As briefly reported last week, Imperial Airways are carrying out a practical test with a Bristol "Jupiter" engine by one of their pilots, Col. Minchin, flying from Croydon to Cairo and back in a Bristol "Bloodhound" fitted with a

"Jupiter"—the same engine we understand which recently completed the 25,000-mile sealed flying test. Col. Minchin left Croydon in the early hours of June 4, and was accompanied by Mr. F. Mayer, the Bristol Co.'s chief engineer.

The Second L.A.C. Flying Display

THE Lancashire Aero Club will hold its second flying display on Sunday, July 11, at Woodford Aerodrome. At the previous pageant held in April, more than fifteen thousand people were admitted, but it is hoped to make the display to be held in July even a bigger success. It is expected that many aircraft manufacturers will send their latest aeroplanes for the occasion and that also assistance may be given by a formation of R.A.F. machines. There will be aerial fighting, stunting and bomb dropping.

A Flying "At Home"

MRS. SHERWOOD KELLY and Mrs. Elliott Lynn gave the first flying "At home" held in this country on the Stag Lane Aerodrome on June 1, by courtesy of Messrs. De Havilland, Ltd., when about 200 guests were present, over 100 of which were given flights in Mrs. Lynn's, Sir John Rhodes', and one of the De Havilland Co.'s "Moths." Mr. Dudley Watt, in a "Grasshopper," also took a number of passengers, including the Hon. Lady Mary Bailey, whom he flew over Epsom to try and pick out a horse which she had running that afternoon. A number of guests arrived by aeroplane, including Maj. Halford in a Nimbus DH.IX, Capt. Boothman, from the Central Flying School, in a Service "Moth," and Capt. Sparkes, of the London Aeroplane Club, also in a service machine. Capt. Broad gave an exhibition of flying which was very much appreciated. Among those who were present and who actually flew with Capt. Reeves, Mr. St. Barbe, Mr. Dudley Watt and Mrs. Elliott Lynn, were the following: Princess Louis de Bourbon, the Hon. Lady Henniker-Heaton and Miss Henniker-Heaton, Lord Decies, Admiral Sir Hamnet and Lady Shere, Capt. and Mrs. De Havilland, Lady Swinburne, Sir Gerald Burton, Sir Griffiths Boyton, Mrs. Carlton Walker, Miss Beatrice Osmund.

U.S. AIR MAIL SERVICES

Offshoots from the Transcontinental Route

THE month of April last saw the eighth anniversary of the United States Air Mail Service, and during this period of its existence close on 12,000,000 miles have been flown and millions upon millions of letters have been carried safely along its routes. Starting on May 15, 1918, with a line between New York and Washington, the service was added to from time to time until, in September, 1920, the air mail route extended from New York to San Francisco, a distance of 2,640 miles. This Transcontinental service has been in operation without a break up to the present time and has each year met with increasing success. At first, the service was operated only during the period of daylight—the mails proceeding at night by rail—but in 1920, a night-flying section, between Chicago and Cheyenne, was introduced whereby the mails were air-borne from start to finish with a resulting saving of time.

Until recently converted D.H. biplanes, fitted with 400 h.p. Liberty engines, were employed on the air mail service, but with the introduction of night flying, new machines, specially designed for air mail work, were obtained.

(Chicago, Ill., via Springfield, Ill., to St. Louis, Mo., and return), 280 miles.

C.A.M. No. 3.—National Air Transport, Inc., Chicago, Ill. (Chicago, Ill., via Moline, Ill., St. Joseph and Kansas City, Mo., Wichita, Kans., Oklahoma City, Okla. to Dallas and Fort Worth, Tex., and return), 1,000 miles.

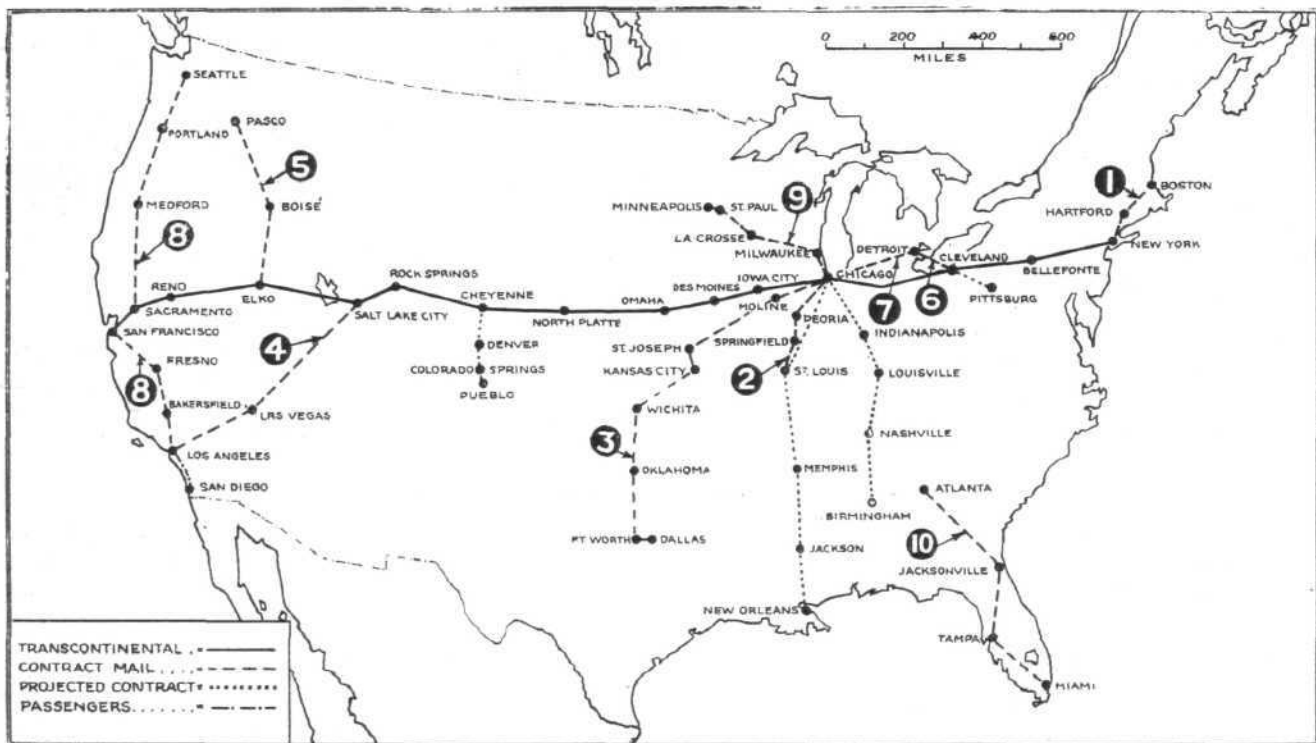
C.A.M. No. 4.—Western Air Express, Inc., Los Angeles, Calif. (Salt Lake City, Utah, via Las Vegas, Nev., to Los Angeles, Calif., and return), 600 miles.

C.A.M. No. 5.—Walter T. Varney, San Francisco, Calif. (Elko, Nev., via Boise, Idaho, to Pasco, Wash., and return), 430 miles.

C.A.M. No. 6.—Ford Motor Co., Dearborn, Mich. (Detroit, Mich., to Cleveland, Ohio, and return), 100 miles.

C.A.M. No. 7.—Ford Motor Co., Dearborn, Mich. (Detroit, Mich., to Chicago, Ill., and return), 250 miles.

C.A.M. No. 8.—Pacific Air Transport, San Francisco, Calif. (Seattle, Wash., via Portland and Medford, Oregon, Sacramento, San Francisco, Fresno and Bakersfield, Calif., to Los Angeles, and return), 1,080 miles.



U.S. AIR MAIL SERVICES : Sketch map of the United States, showing the Transcontinental Air Mail route now eight years old—and the ten new Contract Air Mail Routes.

We do not propose to dwell further on the Transcontinental route—full details of which have already been published in past issues of FLIGHT—but will give our readers some particulars—for which we are indebted to our American contemporary *Aviation*—of the latest developments of the U.S. Air Mail Service.

So successful has this air mail service proved, it was decided to extend air mail services in other directions. By virtue of legislation passed at the last session of Congress (popularly known as the Kelly Bill) it has been possible for the U.S. Post Office Department to enter into contracts for the transport of mail by aircraft with individuals, firms or corporations throughout the U.S.A. One of the provisions of the Department regarding contract services provided that only mail bearing postage at the rate of 10 cents per oz., or fraction thereof, would be carried.

Up to the present the P.O. Department has entered into contract with ten concerns for the handling of air mails in various parts of the States, and further contracts are under consideration. The ten new "Contract Air Mail" services, with approximate mileages, are made up as follows:—

C.A.M. No. 1.—Colonial Air Lines, Inc., Naugatuck, Conn. (Boston, Mass. via Hartford, Conn., to New York and return), 200 miles.

C.A.M. No. 2.—Robertson Aircraft Corp., Anglum, Mo.

C.A.M. No. 9.—Charles Dickinson, Chicago, Ill. (Chicago, Ill., via Milwaukee and La Crosse, Wis., to St. Paul and Minneapolis, Minn., and return), 400 miles.

C.A.M. No. 10.—Florida Airways Corp., New York (Atlanta Ga., via Jacksonville, Tampa and Fort Myers to Miami, Fla., and return), 450 miles.

The positions of these ten contract routes in relation to the original Transcontinental line, are shown in the accompanying sketch map. In this map, we also show a small air line between Los Angeles and San Diego. This, however, is not an air mail service, but is a very efficient passenger service which has been in operation, without Government subsidy, for over a year, and is maintained by Ryan Airlines, Inc., a very active aviation concern of 3½ years' standing. We have included it as a matter of passing interest, and we might add that Ryan Airlines, Inc., have also constructed a special type of air mail aeroplane which is being used on one of the Contract Air Mail routes—of which, more anon. Four projected contract routes are also shown: Cheyenne to Pueblo, Chicago to New Orleans, Chicago to Birmingham, and Cleveland to Pittsburgh.

In subsequent issues of FLIGHT, we shall give some brief particulars of each of the ten Contract Air Mail routes, together with illustrations of the machines employed.

IN GLOUCESTERSHIRE AND SOMERSET

By MAJOR F. A. de V. ROBERTSON, V.D.

THE great strike had this in common with other ill-winds that it blew a measure of relaxation to a few people. In the case of the present writer it made visits to aircraft factories more leisurely and peaceful than is often the case. The visitor was not deafened by the clang of machinery, and was not oppressed by the feeling that he was taking up, and possibly wasting, the valuable time of the staff. The staffs, of course, were busy, especially in the drawing offices, and were apparently enjoying the air of peace and calm which brooded over the works as they pushed on with their calculations; but they were better able to spare time for visitors than on normal occasions.

The Bristol Aeroplane Co., Ltd.

It was a wet and gloomy day when I stopped my car at Filton and was cordially received by Mr. Fedden. Of course, the first proceeding was a walk round the engine shops. It is some time since I last visited Filton, and I was greatly struck by the changes made in the interval. On the former occasion the Jupiter had not yet been put on production. Now, an out-turn of three Jupiters per week is not considered sufficient, and the shops are in process of re-arrangement with a view to making possible an output of six per week. An increase of 100 per cent. is always impressive. But when one learns that the sale of Jupiters by the Gnome and Le Rhone company is considerably greater than the output at Filton, while the factories in Italy and Czecho-Slovakia are also busy, one realises with great satisfaction how extremely popular this British air-cooled engine is in the world. Filton makes only the latest mark of Jupiter—by this time it cannot possibly violate any official secret to murmur the mystic numeral six—while the other countries produce mark four. Yet mark four is gladly snapped up on the Continent and is everywhere making aeronautical history. I was shown the latest developments, the substitution of duralumin for aluminium in certain parts, and the introduction of other special metals elsewhere to counteract various effects of temperature set up when running. Very interesting was a visit to the room where the parts are covered externally with a deposit of zinc. This resists corrosion by acids or by salt water, and makes the Jupiter suitable for use on a seaplane. In the finished Jupiter nearly all the metals are of the same dull grey colour. At another factory a designer remarked to me that he thinks the Jupiter a very handsome engine. I agree. Then we went into the foundry. When last I visited Filton there was no foundry on the spot, and the addition is one more evidence of the progress of the last few years. It is always inspiring to have a talk with Mr. Fedden because he takes such a long view. Some men are content to turn out what will sell at the moment—and small blame to them when the market is so restricted. Mr. Fedden is not content to do that. He considers what flying will be likely to need five years ahead and ten years ahead, and lays his plans accordingly. Five years is a long period in the history of aircraft and aero engines. He believes that the world's demand for aero engines will gradually crystallize into a definite number of classes, according to power, and he has his own ideas as to the number of those classes which he hopes to provide at Filton. It is rather sad to learn that the gallant little Cherub does not fall into any one of those classes. It is admittedly a beautiful little engine, but ever since the second Lympe week I do not think that Mr. Fedden has really believed in its future. It is in fact now going out of print, and when I was at Filton I believe that there were not more than four new Cherubs for sale. It is quite probable that some intending competitors for the *Daily Mail* prizes in September will leave their orders until too late and so be unable to obtain one. A day or two later I was able to give this tip to a probable entrant, who promptly made a note that he would ring up Filton that afternoon and book a Cherub. While at Filton I heard other names from Roman mythology mentioned, but for the present we must leave the gods of Olympus to keep their own secrets.

So interesting was Mr. Fedden, that I am afraid I kept Mr. Fernie waiting some time for lunch. I had a long discussion with him about prospects in Australia, where the Bristol Tourers still continue to give excellent service on the West Australian airway between Perth and Derby. The Bristol Tourer was the first commercial aeroplane to be used on any regular mail service in the British Empire (one cannot count the brief experiment of carrying mails between Karachi and Bombay with D.H.10's in 1919), and since December, 1921, the six Bristol Tourers have borne the brunt of maintaining a weekly service each way over the longest airway

in the world, with practically 100 per cent. efficiency. The distance between the two termini is 1,442 miles, and since the inauguration of the service up to the beginning of the present year, W.A.A. machines have flown 568,400 miles, carried 2,603 passengers (that is paying passengers), and 645,247 letters.

As for modern times, the firm is very actively engaged in preparing for the day when metal will supersede wood, and its work on steel was very interesting to see. It was also gratifying to notice the number of crates containing Bristol school machines with "Lucifer" engines, ready for despatch to foreign countries. I left Filton after a most enjoyable visit, with a great impression of progress.

George Parnall and Co.

Yate, where the works of the Parnall firm are located, is about a mile west of Chipping Sodbury, and some 12 miles north-east of Bristol, in a charming part of Gloucestershire. Mr. Bolas, the designer of the firm, took me round. Here, too, the calm of the strike lay over the works; and here, again, very active preparations for the day of metal could be studied. It is very interesting to compare the different angles from which various firms approach this problem, the preference for steel here, for duralumin there, for a combination of metals in a third place, and in a fourth a combination of metal and wood. It remains for experience to prove what will ultimately be the best policy (if an ultimate best is ever attainable), and in the meantime one sees that it would be rash to make the expression "all metal" into a shibboleth.

Apart from machines which will shortly make their debut before the Air Ministry experts, the works of Geo. Parnall and Company are much occupied (apart from strike preoccupations) in reconditioning D.H.9a bombers. We all know that this type is a much-respected veteran which it is hard to replace, though one would very much like to see British engines used for it. The works, however, looked incongruous with the contrast of hoary age beside the brilliant conceptions of today and tomorrow. Yate is not a large factory, but it is full of ideas, and one feels that with Mr. Bolas about, the factory may expand to any size in the not distant future.

I may mention that there is one real "thrill," as the evening papers have it, at Yate. The firm is at work on designs for two autogiros. The Air Ministry has ordered one, a single-seater, and in all probability a two-seater will be produced privately as well. Mr. Bolas is deep in the problems of this modern mystery. The blades will have to be started by power and not by hand, and that provides one problem. A problem of a different order is to fit in a second seat. Mr. Bolas is a master of aeronautical jig-saw puzzles, and if anyone can fit in that seat neatly, I feel sure that he can do it. And we all hope to see him and one of the "Pixies" down at Lympe in September.

The Gloucestershire Aircraft Co., Ltd.

I stopped my car in the streets of Cheltenham to ask the way to Sunningend works. A respectable-looking man directed me, and added wistfully, "I'd come and show you sir, if I could." Then his feelings overcame him, and he burst out: "It's the first time I've ever had to go on strike, and it's simply damnable." I presumed that he was an employee of the Gloucestershire Aircraft firm, and I can quite understand that they would all prefer working in their factory to roaming the streets on a rainy day. A mighty big works they are at Sunningend, and on the road from Gloucester I had passed their aerodrome, on which tremendous hangar accommodation awaits the day when aircraft will really come into its own. Sunningend is all methodically arranged and beautifully appointed. Even to wash one's hands in the great tiled hall provided for the men's ablutions is an aesthetic pleasure. After seeing the view over the Cotswolds from the windows of the exalted drawing office, I began to understand why Mr. Folland can design aeroplanes which fly so much faster than most other people's machines. That view alone must be an inspiration. Mr. Longden, managing director, hospitably entertained me, and he and Mr. Folland took me round the works. Of course, I saw "Gamecocks" and "Glostors" and old "Mars I," and, equally, of course, I saw Mr. Folland's version of metal work. There is no doubt about it, our British firms are not lagging behind.

The Westland Aircraft Works.

Gloucestershire, a beautiful county, had not treated me well in the matter of weather. Somerset beamed upon me.

There is a central plain of Somerset, drained marsh land, fringed all round with little ranges of hill, Mendips, Quantocks, &c., so that the eye is never wearied by monotony of view. Under a bright blue sky this whole plain flamed with buttercups. Talk about the Field of the Cloth of Gold—just give me Somerset on a fine day in May. The roads of Somerset, too, are better cared for than those of most counties. All this would put anyone in a good temper, and, in my case, the charming situation of that most poetically-named town, Yeovil, completed my satisfaction.

The Westland Aircraft Works, as everyone knows, are a branch of Petters, Ltd., of oil-engine fame, and the two factories stand in the same compound. The aerodrome beside the works was very busy when I arrived. Commander Perrin has described in *FLIGHT* how it was made the centre for the distribution of newspapers in the West, and I arrived there in time to see the heterogeneous fleet of aeroplanes dispersing to the four winds. The strike was over by that time, but I was told that the Westland Aircraft Works, unlike the firms in Gloucestershire, had hardly been affected by it.

Mr. A. Davenport, the firm's designer, acted as my cicerone. This firm is fortunate in possessing a wind tunnel, no small testimonial to its spirit of enterprise. I was, of course,

shown the working of the tunnel. The great bomber *Yeovil* with Condor engine dominated the machine shed. At the Westland Works I was pleased to renew acquaintance with Captain Keep, once the firm's test pilot, and now, since his crash, their Technical Superintendent. I remember meeting him first at the Aero Exhibition at Olympia, where he mounted guard over the Westland Limousine which won the Air Ministry competition at Martlesham and afterwards (unless I am confusing it with one of its brothers) went to Newfoundland with Major Sydney Cotton to hunt for seals. But I was unfortunate in missing Captain G. T. R. Hill, who has joined the Westland staff. *Yeovil* is to be the future home of the clan of Pterodactyls, but the plans made are not yet ready for publication. This is, however, a development of the greatest interest, and in due course there will be stories to tell. By the way, before long we shall in all probability hear more of our old friends the light aeroplanes *Widgeon* and *Wood Pigeon*.

What with Pterodactyls, autogiros, whatnots, and all the unmentionables, the West is teeming with aeronautical life and progress. Nothing could have been more hospitable than the way in which I was entertained everywhere; and, on leaving, my only regret was that there were no more aircraft firms in the West for me to visit.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

SPEED AND USEFUL LOAD

[2135] In a letter in your issue of May 6, Mr. B. Stephan, on behalf of the N.V. Nederlandsche Vliegtuigenfabriek "Fokker," has detailed very concisely the reasons for their using as an indication of efficiency a coefficient combining useful load carried per horse-power and maximum speed.

I have carefully re-read my letter in your issue of April 8, and I really cannot agree with Mr. Stephan that my words suggest that speed is of small importance, for I make there the specific "proviso of a certain minimum speed." This minimum varies on different lines from perhaps 100 to 120 m.p.h., and is thus in no way inconsistent with "the very nature of the load to be transported."

Several interesting points arise from Mr. Stephan's letter, but the main issue is this: Given this minimum speed, is it fair and reasonable to assess the comparative commercial efficiency, which should clearly be of "practical value for the aeroplane user," by taking the product of useful load per horse-power and top speed? Mr. Stephan maintains it is.

Let us see what the aeroplane user himself might feel about it.

Suppose this coefficient for two machines to be 22×10^4 in lbs. and m.p.h. Thus one machine could carry 2,000 lbs. for x miles at 110 m.p.h., whilst the other would take 1,700 lbs. at 130 m.p.h. over the same distance. Now these are two machines therefore of equal commercial efficiency, and I think the user would apply to Mr. Stephan, as I do, to be told "how." I would also like to know how the coefficient gives any "insight into the fundamental characteristics of the machines under comparison."

I am glad Mr. Stephan does not contend that this coefficient has any scientific value, but nevertheless it contrives "to indicate whether from considerations of aerodynamical finesse one machine is better than another."

I cannot think that Mr. Stephan means this, for it will be seen that, whilst total load carried per horse-power \times top speed is an expression proportional to overall $\frac{L}{D}$, and therefore indicative of aerodynamical finesse, the coefficient we are dealing with does not necessarily bear any relation to this characteristic of a machine.

I fear I have been misunderstood in my criticism of the "Fokker" coefficient on the grounds of slovenliness. I felt

this to be the case because when using the coefficient no definition appeared to be given of "useful load," and the range of the flight was unstated. I have not all the Bulletins by me, however, and thus possibly I have done an injustice here. If so, I apologise. It is, however, essential to be clear on these basic points, and for my part I much prefer the term "paying load," which leaves little room for doubt.

I can well understand that Mr. Stephan is loth to drop the speed term in the coefficient of operational efficiency because it does give a constructor the extra mark he deserves for a clean design. But it must be remembered that no potential purchaser looks solely at the load carried per horse-power; in particular, he will also see that the top speed is adequate for the work in hand. If, however, a figure of merit for speed is desired, surely the other coefficient, total load carried per horse-power \times top speed is the proper one to use. I cannot see any advantage whatsoever is gained by bastardising a perfectly respectable term such as paying load per horse-power in order to exemplify any particular design. And so far as practical value to the aeroplane user is concerned, I think, from the example I have given, the misleading nature of the "Fokker" coefficient is sufficiently apparent.

There is one other point in Mr. Stephan's letter to which I would refer—the manner in which, where my words appear to him to have more than one interpretation, he credits me with the more rational meaning. I can recollect at least one previous discussion in your columns where, had this course been adopted, the technical points involved would have been less obscured by invective.

O. E. SIMMONDS

Southampton,
June 3, 1926.

THE HILL TAILLESS MACHINE

[2136] With reference to your article on the discussion of the "Hill Tailless Machine" in *FLIGHT*, dated April 29, I notice you attribute some remarks to me which are apparently not quite correct. I think I really said that the control under normal conditions was very similar to the control of a very large machine. Actually the machine is particularly pleasant to fly, although it does not feel like a light 'plane, which is probably due to its very big span.

R. DE H. HAIG (Sgdn.-Ldr.)

Royal Air Force Dinner Club

Past and serving officers of the Royal Air Force (and Royal Naval Air Service and Royal Flying Corps) are eligible to belong to this club, which was founded in 1923 to provide an annual reunion dinner at which past and serving officers of the flying services might meet: the eve of the Royal Air Force Display was selected as being a date on which the largest number of members would be in London. No restriction on membership will be imposed until such time as the total

membership reaches 500. The subscriptions are £3 3s. for life membership or 5s. annually, payable on entrance and thereafter on January 1 each year. The fourth annual dinner will be held in the Connaught Rooms on July 2; the cost of the dinner will be 10s., exclusive of wines, and it is hoped that the Secretary of State for Air and the Under-Secretary of State for Air will be present as the guests of the club. Forms of application for membership may be obtained from: The Honorary Secretary, Bentley Priory, Stanmore, Middlesex.

THE ROYAL AIR FORCE

London Gazette, June 1, 1926

General Duties Branch

The following are granted short service commissions as Pilot Officers on probation, with effect from and with seniority of dates indicated: J. D. Allcroft, A. Allen, E. S. Baverstock, S. C. Bell, A. M. Butt (Sec.-Lt., Devon R., T.A.), J. F. O'R. Coleman, M. R. Edmondson (Sec.-Lt., F.A., T.A.), L. E. R. Fisher, M.C. (Lt., R.A.R.O.), P. A. Hawkesworth, C. H. Hockly, A. M. D. Howes, G. H. G. S. Jenkins, W. E. P. Johnson, L. T. Keens, F. L. Lawrence, P. G. Lucas, L. G. Martin, A. L. Mortimer (Sec.-Lt., R.A., T.A.), K. C. Nether-ton, S. Pritchard-Barrett, H. J. G. E. Proud, B. F. O. Smith, R. H. C. Taylor, E. D. Turner (May 8); C. F. Ashton (May 9); E. L. Burslem (May 10).

London Gazette, June 4, 1926

General Duties Branch

The following are granted permanent commissions in the ranks stated (June 1):—Flight Lieut. F. J. W. Mellersh, A.F.C.; Flying Officers D. F. Anderson, D.F.C., T. W. S. Brown, J. L. Wingate.

The following Pilot Officers are promoted to rank of Flying Officer:—W. T. Holmes, P. H. Nicholls (Feb. 15); J. S. Georgeson (April 15). Flying Officer J. P. Cafferkey is restored to full pay from half-pay (May 31); Flying

Officer N. Vincent, D.F.C., is placed on half-pay, Scale B (May 31); Flight Lt. M. Keegan, O.B.E., M.M., is placed on retired list, and is granted permission to retain rank of Squadron Leader (June 1). The short service commissions of the following Pilot Officers on probation are terminated on cessation of duty (June 1):—W. G. du Bédat, J. A. Grieves.

Stores Branch

Flight Lt. J. V. Mason is granted a permanent commn. in this rank (June 2); Flying Officer W. Bourne is granted a permanent commn. in this rank, with effect from Aug. 10, 1925, on completion of probationary service.

Accountant Branch

Wing Commander W. H. Holroyd is placed on retired list at his own request (June 1).

Reserve of Air Force Officers

The following Flying Officers are transferred from Class A to Class C.—J. F. Horsey (May 5); C. R. McMullin (May 19). The following Flying Officers relinquish their commns. on completion of service:—G. T. Griffith, T. B. Tully, A.F.C. (April 20); P. G. Addie, G. Cameron (May 15). Flying Officer C. W. Sutcliffe relinquishes his commn. on account of ill-health, and is permitted to retain his rank (June 2).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore H. C. T. Dowding, C.M.G., to Air Ministry, on appointment as Director of Training, 27.5.26.

Wing Commander A. C. Maund, C.B.E., D.S.O., to H.Q., Air Defence of Gt. Britain, Uxbridge, for Tech. Staff duties, 1.6.26.

Squadron Leaders: W. V. Strugnell, M.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 9.5.26. A. Coningham, D.S.O., M.C., D.F.C., A.F.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 9.5.26. W. S. Caster, M.C., to No. 70 Sqdn., Iraq, 8.5.26. A. J. Currie, to No. 10 Group H.Q., Lee-on-Solent, 19.5.26. V. S. Brown, to Central Flying Sch., Upavon, 19.5.26. T. E. Salt, A.F.C., to No. 12 Sqdn., Andover, 19.5.26. E. H. Sparling, A.F.C., and E. A. Beulah, to H.Q., Air Defence of Gt. Britain, Uxbridge, 1.6.26. W. B. Hargrave, O.B.E., to R. A. F. Depot, Uxbridge, on transfer to Home Estab., 1.5.26.

Flight Lieutenants: M. A. Simpson, to No. 39 Sqdn., Spittlegate, 1.6.26. R. Jope-Slade, D.S.C., to No. 32 Sqdn., Kenley, 21.5.26. H. V. Rowley, to Aeroplane and Armament Experimental Estab., Martlesham Heath, 1.6.26. S. D. Culley, D.S.O., to Aeroplane and Armament Experimental Estab., Martlesham Heath, 25.5.26. L. J. Riordan, A.F.C., to No. 58 Sqdn., Worthy Down, 27.5.26. H. W. Evans, to Elect. & Wireless Sch., Flowerdown, 14.5.26. S. Graham, M.C., to No. 27 Sqdn., India, 3.5.26. A. C. B. Harrison, M.C., to No. 2 Wing H.Q., India, 22.4.26. J. F. T. Barrett, D.F.C., to No. 84 Sqdn., Iraq, 8.5.26. O. E. Carter, to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 1.5.26. A. J. Warwick, to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 9.5.26. R. C. Bryant, to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 15.5.26. W. H. Park, M.C., D.F.C., to H.Q., Air Defence of Great Britain, Uxbridge, 1.6.26. A. R. Jones, to Schl of Photography, Farnborough, 1.4.26. R. Ivelaw-Chapman, D.F.C., to No. 99 Sqdn., Bircham Newton, 10.6.26.

Stores Branch

Wing Commander F. C. Williams, O.B.E., to H.Q., Air Defence of Gt. Britain, Uxbridge, for Stores Staff duties, 1.6.26.

Squadron Leaders: F. A. Baldwin and T. G. Skeats, to H.Q., Air Defence of Gt. Britain, Uxbridge, 1.6.26.

Flying Officers: A. Walters and C. A. Longhurst, to H.Q., Air Defence of Gt. Britain, Uxbridge, 1.6.26.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

Lieut.-Commander (Flying Officer, R.A.F.) R. H. Portal, D.S.C., to *Eagle*, and for full flying duties in 460 Flight (April 22).

Lieuts. (Flying Officers, R.A.F.): A. M. Pilling, to *Columbine*, and for No. 406 (F. Fighter) Flight, supy., for final deck landing training (May 27); F. M. R. Stephenson, to *Furious*, and for 443 Flight; and G. R. M. Robertson, to *Furious*, and for full flying duties in 443 Flight (May 30); G. Willoughby, J. H. Burroughs, and G. F. Renwick, to *Hermes*, and for full flying duties in 403 Flight (April 9); and R. H. Langton, to *Eagle*, and for full flying duties in 402 Flight (April 22).

Royal Marines

Lieuts. (Flying Officers, R.A.F.): O. C. Jones, to *Hermes*, and for full flying duties in 403 Flight (April 9); and S. C. Wolley, to *Eagle*, and for full flying duties in 423 Flight (April 22).

IN PARLIAMENT

Royal Air Force Pilots

SIR F. SYKES, on May 13, asked the Secretary of State for Air the maximum age at which regular officers of the Royal Air Force are permitted to qualify as pilots; the maximum age at which any regular officer has so qualified during the past three years; and the estimated cost of training regular officers for pilot qualification?

SIR S. HOARE: The answer to the first part of the question is that no maximum age is laid down, for the reasons explained in my answer to the hon. and gallant Member for Southwark Central (Colonel Day) on April 21. The answer to the second part is 49 years. The officer in question learnt to fly at his own request at his unit, where he was employed on technical duties, at no additional cost beyond petrol, oil and ordinary wear and tear. As regards the last part, no exact costed figure for the training of a Service pilot is available, but as a rough estimate the cost may be taken as in the neighbourhood of £2,000.

(Published in Hansard, June 1.)

Cairo-Cape Flight

SIR H. BRITAIN, on June 3, asked the Secretary of State for Air whether he can give the House any information with regard to the Cairo-Cape-Cairo flight by the Royal Air Force; whether the flight has been a complete success; and what has been the number of miles flown?

SIR S. HOARE: The flight from Cairo to the Cape and back was completed on May 27, when the four aircraft returned to Heliopolis one day in advance of the programme. A full report has, of course, not yet been received, but I am able to say that the flight was a complete success and that the four aircraft accomplished the journey of approximately 10,500 miles without any change of engines.

SIR H. BRITAIN: In due course, will an official account of this very interesting flight be available?

SIR S. HOARE: Certainly. I am waiting until the flight is completed. I am hoping that the machines will arrive in the course of the next few weeks.

R.A.F. and Distribution of Newspapers and Mails.

COLONEL DAY, on June 4, asked the Secretary of State for Air if he can state the number of aeroplanes and personnel employed in the distribution of newspapers during the general strike, together with information as to the amount of mails conveyed by aeroplanes during the same period?

SIR S. HOARE: The number of Royal Air Force aeroplanes used each day for the distribution of newspapers ranged from 5 to 15, the daily average being 8, and approximately 18 officers and 70 airmen were engaged regularly or intermittently on work connected with the distribution. 785 mail bags were also carried; the weight is not accurately known. The total number of civil machines employed in newspaper distribution was 37, with approximately 45 pilots; the weight of mails carried was 2,611 lb.

Recruiting

MR. HORN-BELISHA asked how many men are enlisted in His Majesty's Air Force on an average during each month; and how many at each of the recruiting stations?

SIR S. HOARE: As regards the first part of the question, the number of recruits whom it is expected to enlist during 1926-27 will represent an average of 62 recruits a month. As regards the second part, all recruiting work, except for aircraft apprentices, who are entered by examination, is carried out by the London Recruiting Depot, assisted by a small sub-depot with a staff of two at Newcastle. The majority of the recruits are obtained as a result of correspondence, only the most suitable applicants being called to London for interview, trade test and attestation.

The Second R.A.F. Iraq Dinner

It is proposed to hold the second post-war R.A.F. Iraq Dinner at the Hotel Cecil (8.45 p.m. for 9 p.m.) on July 3. The dinner will be solely for R.A.F. officers who have served in Iraq since the Armistice. Air Marshal Sir John M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O., A.D.C., will preside

and Air Commodore A. E. Borton, C.B., C.M.G., D.S.O., A.F.C., will act as vice chairman. Tickets (13s. 6d. exclusive of wines) must be applied for before June 20, and a remittance must accompany the application, together with a statement of the unit with which the officer served. Applications should be made to Flight-Lieut. A. L. Chick, A.F.C., Room 564, Air Ministry, Kingsway, W.C.2.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (S.M.A.E.)

ADVERSE weather conditions prevailed on Saturday, May 29, when the two competitions for fuselage models took place at Wimbledon Common, nevertheless some good flying was witnessed. The first competition was for distance and general stability, and proved full of interest right up until the last flights were taken, the winning distance being 271 yards.

The first three were:—

K. and M.A.A. Cup Competition

	Points.
1st. S. C. Hersom	371
2nd. H. T. Jackson	279
3rd. B. K. Johnson	274

Pilcher Cup Competition

(Duration competition for fuselage models rising off ground)

	Secs.
1st. D. A. Pavely	19
2nd. A. Rasmussen	12½
3rd. S. C. Hersom	10½

The next competition is for the S.M.A.E. Cup (for highest speed attainable with fuselage models not exceeding 1 sq. ft. in lifting surface). This will be held on Sunday, June 20 (3 p.m.) at the Royal Dental Hospital Sports Ground (Hendon)—nearest station "Colindale," on the Hampstead Tube. Members are asked to note that on this day no records other than speed will be taken.

B. K. JOHNSON, *Secretary*



R.A.F. Cairo-Cape-Cairo Flight

WING-COMMANDER C. W. H. Pulford and his three companion pilots, who recently successfully concluded their flight from Cairo to Cape Town and back on four Fairey III D aeroplanes (Napier "Lions") are expected to arrive in England on June 21, at the Lee-on-Solent seaplane station.

London-Cologne Air Service

It is stated that the German Government has prolonged until December 31 the permission granted to the Imperial Airways, Ltd., to operate the Berlin-London and Cologne-London air lines jointly with the Deutsche Lufthansa.

U.S. Army Air Service Expansion

A BILL for the expansion of the United States Army Air Service so as to provide 1,800 new aeroplanes at the end of five years has been passed by the House of Representatives and the Senate.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House, Caxton Street, on June 3. Lieut.-Commander H. E. Perrin was in the Chair, and the other Members of the Committee present were:—Mrs. L. M. K. Pratt-Barlow, O.B.E.; Squadron Leader E. B. Beauman.

The Committee considered in all eighteen cases, and made grants to the amount of £221 8s. 6d.

The next Meeting was fixed for June 17, at 2.30 p.m.

Air League of the British Empire

WE are asked to announce that the annual general meeting of the Air League of the British Empire will be held at 26, George Street, Hanover Square, London, W. 1, on June 23 at 5.30 p.m. Any nomination for officers of the Air League or for the Executive Committee must be sent in writing to the secretary, and such nominations must be received by him at least seven days before the date of the annual general meeting.

Awards to Inventors

In the fourth report of the Royal Commission on Awards to Inventors, just published, the following items relating, directly or indirectly, to aeronautics appear:—No. 335, The Green Engine Co., Ltd., "Green" engines (Head II), £500 plus royalties. No. 348, Mr. H. E. Whiteway, aircraft landing gear (Heads I and III), nil. No. 349, Wing-Comdr. H. R. Busteed, aircraft landing gear (Head III), nil. No. 350, Wing-Comdr. H. A. Williamson, aircraft landing gear (Head III), £500.

Cross-Channel Aeroplane Lost

ONE of the French Air Union Breguet machines, F.FADI, piloted by M. de Mazin, left Le Bourget with freight on May 31, failed to reach Croydon as scheduled, and no news of the pilot was heard until a fruit cargo boat, the *Volga*, recovered the pilot's body from the sea some 10 miles off the North Foreland on June 3. The body was brought to Victoria Wharf, Limehouse, and was identified as that of the missing pilot.

Naval Officers in R.A.F.

THE following designations of Naval officers serving in the Royal Air Force are notified in Fleet Orders:

"Attached": Naval officers serving in the R.A.F. under the conditions of Admiralty Fleet Orders, 1053/24.

"Lent": Naval officers serving in the R.A.F. under Naval conditions as regards pay, rank, &c.

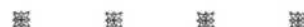
"Seconded": Naval officers serving in the R.A.F. entirely under Royal Air Force conditions.

Fairey-Reed Progress

EXCELLENT progress in the development of the Fairey-Reed all-metal airscrew is to be recorded. Recently the Fairey Aviation Company has made highly successful tests with a new type of Fairey-Reed propeller of the type having a forged boss, and thus more resembling, as regards its inner portion, the wooden propeller. The results were very gratifying, and it was noticed that the new propeller, apart from other advantages, was absolutely silent. In the meantime, it is highly satisfactory to be able to record that the company has received an order for Fairey-Reed airscrews from the Dornier company of Italy, for use on the machine which that firm is building for the Marchese de Pinedo. It is worth pointing out that this order was obtained in direct competition with foreign companies building the Reed airscrew under licence, and that orders from other Italian firms have also been received. Among the list of notable flights made with machines using the Reed propeller may be mentioned Commander Byrd's flight to the North Pole and back, Captain Wilkins' polar flights, and Lieut. Medaerts' flight from Brussels to Belgian Congo and back. The Fairey-Reed will be used on Alan Cobham's forthcoming flight to Australia.

Congratulations!

His many friends will be pleased to hear that Mr. S. S. Spriggs, of the Hawker Engineering Co. was, on June 4 at Montrose, Thames Ditton, presented by his wife Gladys with a daughter!



PUBLICATIONS RECEIVED

Journal of the American Society of Naval Engineers. May, 1926. American Society of Naval Engineers, Navy Department, Washington, D.C., U.S.A.

The Professional Photographer. May, 1926. Kodak, Ltd., Kingsway, London, W.C. 2.

Cambridge Versatile Galvanometer. The Cambridge Instrument Co., Ltd., 45, Grosvenor Place, London, S.W. 1.



AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1925

Published June 4, 1926

- 8,361. H. E. S. HOLT. Parachute apparatus. (251,412.)
- 8,977. SOC. ANON. DES ATELIERS D'AVIATION L. BREGUET. Joints of tanks. (235,145.)
- 9,598. A. R. THORNBLAD. Parachutes. (232,253.)
- 9,706. J. H. HORBACK and F. NENDEL. Flying machines. (251,419.)

Published June 11, 1926

- 3,053. G. BAIN. Device to slow down and sustain an aeroplane at speeds less than that ordinarily required to sustain the machine. (251,685.)
- 9,672. SIR W. G. ARMSTRONG, WHITWORTH AIRCRAFT LTD., and F. PRATT. Air-screws. (251,753.)
- 13,466. A. TAMMO and OTHERS. Planes of aeroplanes. (236,176.)
- 21,507. CRANKLESS ENGINES, LTD. Swash plates or slants for crankless engines. (244,052.)

APPLIED FOR IN 1926

Published June 11, 1926.

- 1,738. G. FORNACA. Aircraft propellers. (251,908.)
- 2,141. H. JUNKERS. Forced lubrication of crankshafts. (246,518.)
- 3,288. N. BRAIBANT. Apparatus for indicating and recording rolling and pitching. (251,918.)

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